Abstract Submission for

Environmental Public Health Tracking Workshop
October 13-15, 2004
San Francisco, California

Title: Hospital and particulate matter data linkages in communities exposed to wildfire smoke

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Topic: Tracking of hazard, exposure and/or health outcome data

ABSTRACT

Title: Hospital and particulate matter data linkages in communities exposed to wildfire smoke

Keywords: particulate matter (PM), asthma, cardiovascular, hospital, wildfire, inversion

Background: Western Montana provides a unique opportunity to explore environmental public health tracking data linkages in small communities. The coverage area for existing ambient air pollution monitoring stations is limited by the mountainous terrain. However, communities in these areas are subject to high variations in ambient PM concentrations due to periods of winter inversions and smoke from summer wildfires.

Objective: This pilot study was designed to explore retrospective PM and hospital data for asthma and cardiovascular conditions with a particular focus on variability in PM exposures due to wildfire events or winter inversions.

Methods: PM2.5 data, sampled every third or sixth day, were collected for a four-year period. Emergency department data were collected from five hospitals. Electronic data from five hospitals were collected for patient visits with a primary diagnosis of asthma or cardiovascular disease.

Results: Monthly average PM2.5 concentrations for Missoula ranged from 4.6 ug/m3 to 45.3 ug/m3 with peak exposures occurring during two prolonged wildfire episodes and intermediate exposures occurring during winter inversions. During wildfire episodes of 2000 and 2003, hospital visits for asthma increased by 104% and 76% compared to the preceding months. Similar, but less consistent, patterns were observed during winter inversion periods.

Conclusion: In this small study area, data averaged over monthly periods were sufficient to characterize periods of high PM2.5 exposure and corresponding increases in hospital visits for asthma. Exposure variability within these high exposure periods was uncertain due to the intermittent PM2.5 sampling schedule.

Evaluation: Modeling strategies will be used to evaluate the variability in PM2.5 exposures during wildfire episodes and winter inversions. Time-series analytical techniques will be used to discern associations between PM2.5 and asthma or cardiovascular disease during variable exposure periods.